Soil Conservation

July 1979

U.S. Department of Agriculture

Great Lakes Cleanup 4

Name That Flume 10

Behind the Scenes at Disney World 12

From the Administrator

Water for Tomorrow

In the middle of a good irrigation year in many States, it is time to think about getting ready for the not-so-good water supplies of next year or the year after—or of next month!

Water conservation and efficiency in water use are urgent in *all* years and in *all* States. They affect sustained food and fiber production, availability of water for other purposes, and quality of water for all purposes. They also affect farm energy costs.

Irrigation does need more research—of 13 top-priority water research needs recently identified by USDA's Science and Education Administration, seven relate to irrigated agriculture.

Other questions were raised at public meetings led by Secretary Bergland earlier this year. For example:

- How would a statewide or regional agricultural water shortage affect the Nation's food and fiber supply?
- What economic and social problems would result from the loss of surface or ground water resources, and how should we address them?
- Should there be a major effort to "import" water to areas that have too little from areas that have plenty, or are there other ways of matching water resources with high-quality lands to achieve food and fiber for future needs?
- Who should make these decisions, and who should carry them out?

Some answers may arise from the Soil and Water Resources Conservation Act (RCA) program and appraisal process. RCA requires that USDA weigh alternative irrigation techniques and their costs; benefits; and effects on soil and water conservation, crop production, and environmental quality.

Other answers are coming from special efforts such as the Wellton-Mohawk project in Arizona and the larger Colorado River Basin Salinity Control Program, where farmers aided by SCS are proving that efficient irrigation cuts water use, improves downstream water quality, and produces excellent crops.

Few land users or States can afford to wait until they have all the answers. Utah already has a more-than-$20-million program of no-interest loans to farmers for installing irrigation improvements that farmers have planned with SCS help. SCS and local conservation districts have aided thousands of land users in nearly every State with planning, installing, and improving irrigation methods and systems.

As irrigated acreage and the demand for food and fiber continue to increase, now is the time for a redoubled effort to aid land users in best use of water now and in the future.

Mel Davis

July 1979, Vol. 44, No. 12

Soil Conservation is the official magazine of the Soil Conservation Service. The Secretary of Agriculture has determined that publication of this periodical is necessary in the transaction of public business required by law of this Department. Use of funds for printing *Soil Conservation* has been approved by the Director of the Office of Management and Budget (through July 31, 1979). *Soil Conservation* (USPS 425–130) is published 12 times a year. Controlled circulation postage paid at Washington, D.C.

Bob Bergland
Secretary of Agriculture

Mel Davis, Administrator
Soil Conservation Service

Prepared in the Information Division
Soil Conservation Service
U.S. Department of Agriculture
Washington, D.C. 20013

Judith E. Ladd
Editor

Nancy M. Garlitz
Assistant Editor

Maryellen Bertram
Editorial Assistant

Christopher Lozos
Design Consultant

Reprint permission
Contents of this magazine may be reprinted without special permission. Credit is not required but is appreciated. Photos available on request.

Commercial names
Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the Department of Agriculture.

Subscriptions
$10 per year, $12.50 foreign. Single copy, 80 cents. Discounts of 25 percent on orders of 100 or more sent to the same address. Order directly from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

All programs of the U.S. Department of Agriculture are available to everyone without regard to race, creed, color, sex, or national origin.

Soil Conservation

Contents

From the Administrator 2

Good Land Care: Cleaner Great Lakes 4
Norman A. Berg

New Measuring Flume for Farm Irrigators 10

Walt Disney World:
A Land of Fantasy Rooted in Environmental Policy 12
Anne Schuhart

The Soil and Water Resources Conservation Act (RCA) 18

Index 19

News Brief 23

Meetings 23

Cover:

- **Front—Topiaries are used for landscaping throughout Walt Disney World in Florida. This one of Mickey Mouse will take 5 years to train before it can be transplanted onto the grounds. Like other ornamentals grown in the Disney nursery, Mickey is drip irrigated with sewage effluent.**
- **Back—"Treehouse" rental units at Disney World were designed according to soil potentials. These soils are subject to flooding, so the main part of the house is off the ground where water can do no damage. See article beginning on page 12. (Photos, Anne Schuhart.)**

by Norman A. Berg

Good Land Care: Cleaner Great Lakes

Sediment from farms in "hydrologically active areas" may be responsible for as much as 60 percent of the phosphorus that finds its way into the Great Lakes. Controlling it will improve water quality and protect soil productivity.

Adapted from a presentation by Mr. Berg at a special conference in Rochester, N.Y., on April 19, 1979. The conference was sponsored by Cornell University and the International Joint Commission.

In less than 200 years, a third of the heavily forested Great Lakes Basin—almost 19 million hectares—has been shifted to cropland and pasture. More than 3 million hectares, or 5 percent of the basin, is now residential, commercial, and industrial. In the next 50 years, another 1 million hectares may be shifted into these urban-type uses.

Both Canada and the United States have profited greatly from these land use changes: The Great Lakes Basin includes the heart of North America's industrial establishment and produces a substantial part of its food and livestock feed. It is home for 35 million people now, and that total may reach 54 million in the next half century.

Yet these changes in land use and attendant population needs also have brought a cost in reduced water quality. Accelerated eutrophication in the lower Great Lakes, and in certain nearshore areas of the upper lakes, has resulted from high levels of phosphorus (loadings). Even with point-source controls in place in both nations, target loadings for phosphorus cannot be met without also reducing phosphorus delivery from diffuse sources, including agricultural lands.

Phosphorus was one of many pollutants studied by a special group at the request of the International Joint Commission (IJC). The Pollution from Land Use Activities Reference Group, or PLUARG, took an indepth look over a 6-year period at:

1. Resource conditions and trends;
2. Efforts already underway;
3. Possible solutions for water-quality and other problems; and
4. Some strategies mandated by the Great Lakes Water Quality Agreements of 1972 and 1978.

PLUARG's final report and a series of technical reports went to IJC last year.

The Findings

PLUARG found that 24 percent (10,850 metric tons) of all phosphorus entering the Great Lakes in 1976 came from the basin's agricultural land. Within agricultural watersheds studied in Ontario, 70 percent of total phosphorus came from cropland—in one watershed it was almost 98 percent.

About 60 percent of the total phosphorus was found to be associated with sediment. The main determinants are:

- How much clay is in the soil; and
- How much of the watershed is in row-crop use.

Soils with high clay content are high in phosphorus content, most susceptible to erosion, and most readily delivered to streams. Physiography, soil erodibility, drainage area, livestock population, and—to a lesser extent—fertilizer application also contribute.

In a given watershed, 80 to 90 percent of the sediment may be contributed by only 15 to 20 percent of the land area. This led PLUARG to the idea of "hydrologically active areas" to describe those parts of watersheds that need attention first and most.

Possible Solutions

Several practices can help control phosphorus losses from agricultural land as part of an overall management strategy to reduce phosphorus loadings from many sources. To be effective, practices must be carefully selected and adapted to the soils and other conditions at each site—there are no simple answers in water quality management.

Conservation tillage, for example, is effective in reducing phosphorus losses on a wide range of soil types. Yet on some soils subsurface drainage also is needed for effective conservation tillage. On some soils, and with some farmers, conservation tillage will not work!

PLUARG recommended that farmers within hydrologically active areas develop water quality management plans for their operating units, to insure that the practices *do* fit the site, *do* blend with each other, and *do not* price the farmer out of farming.

Practices that can reduce phosphorus losses from agricultural land are of three types: Those that:

1. **Reduce soil erosion:** Crop residue management, cropping sequences, seeding methods, tillage methods, soil treatments, and timing of field work. Contour farming also can reduce soil erosion, as Soil Conservation Service employees and conservation district cooperators are well aware. Yet these practices may not be effective where the slope is too long or the watershed area is too big, unless the conservation system also includes other practices.
2. **Control direct runoff:** Contour strip-cropping, terracing, contour listing, sod-based rotations, conservation tillage, and others. Surface runoff from cropland rarely can be *eliminated*. It can be *controlled* by increasing water infiltration rates, surface retention or storage, or interception of rainfall by growing plants or residues.

3. **Manage or control fertilizer and animal wastes:** Limiting and timing fertilizer use; keeping livestock out of some areas near streams; and installing systems to collect, carry, and treat or apply livestock wastes.

All of these types of practices together can make a substantial contribution toward reducing phosphorus losses from cropland and pasture. In the 11 PLUARG study watersheds, the achievable reductions ranged from 36 to more than 50 percent.

Controlling soil erosion and sediment has other significant values besides reducing phosphorus: The soils in the Great Lakes Basin are among the most productive in North America. Keeping them in place and in good shape is important to the world's agriculture and to food and fiber producers. Keeping soil out of streams avoids serious effects on the physical aquatic environment, on fish populations, and on esthetics. Reservoirs will hold more water, bridges and stream channels can be maintained more effectively, and so on.

Benefits of reduced phosphorus loadings through erosion and sediment control are shared by millions of people within and outside the basin.

What about the costs? They vary just as the watersheds, the soils, and the effective practices do. In four PLUARG agricultural watersheds in Ontario, estimated costs range from $15 to $58 *annually* per hectare. In Black Creek, Ind., *initial applications* of the practices cost $146 per hectare. A significant part of the U.S. Lake Erie Basin may be treated at little or no long-term cost to farmers through the use of conservation tillage (although initial outlays for equipment may be an unwelcome cost).

The Strategy

PLUARG's recommendations lay out a strategy for control of *many* pollutants from *all* nonpoint sources. For phosphorus control from agricultural lands, the strategy includes:

- Development of plans;
- Implementation;
- Review and evaluation; and
- Public participation or consultation.

PLUARG said that management plans prepared by government units should include a timetable with program priorities; designate the implementing agencies; set formal arrangements for cooperation within and among agencies; tell what the programs are and how they will be funded; estimate the reductions in phosphorus loadings; estimate the costs to achieve them; and provide for public consultation and review.

PLUARG felt strongly about a role for the public as well as a strong emphasis on information, education, and technical assistance. Every one of the 17 public consultation panels that contributed to PLUARG suggested greater emphasis on information and education.

Their thoughts mirror those of the Great Plains Agricultural Council, which *in 1936* reported about the future of the Great Plains:

"No constructive conservation program can be developed without changing the motivating attitudes and habits and redirecting the efforts . . . of citizens generally in the region. . . . In a democracy, education is more fundamental even than legislation as a force directing rational progress. It is the basis of wise legislation, promotes general acceptance of legislative and administrative measures, and guides individuals to action along lines consistent with the requirements of the society of which they are members."

PLUARG also recommended that, in doing the planning:

- Existing mechanisms be used as much as possible;
- Present fiscal incentives be reviewed;
- Technical assistance programs be given more emphasis;
- Legislation be reviewed to make sure there is a suitable legal basis for enforcement where voluntary approaches prove ineffective, and
- Preventive aspects of laws and regulations be emphasized.

In the past, a keystone of soil and water conservation district programs has been that farmers *voluntarily* came to districts asking for assistance. This is changing somewhat. Pennsylvania and New York State laws now *require* conservation plans. In Ohio, farmers are assumed to be meeting State pollution abatement performance standards *if* they are following conservation plans approved by conservation districts. In Michigan, farmers are not required to have a permit for earth-disturbing activities *if* they are district cooperators.

Implementing the Strategy

PLUARG felt that regional priorities for action should be based on water quality conditions in each lake, the potential contributing areas identified, and the most hydrologically active areas within

them. PLUARG recommended that phosphorus loadings be reduced to achieve targets for individual lakes, and suggested some targets. Further reductions would be even better, in order to improve nearshore water quality and prevent degradation.

PLUARG recommended that erosion and sediment control programs be improved and expanded to reduce the movement of fine-grained soil particles to the lakes.

Agencies should help farmers develop and implement water quality plans for each farm in the most hydrologically active areas, PLUARG said. These plans should consider all potential nonpoint source problems—as well as the farmer's economic livelihood.

PLUARG further recommended that wetlands be preserved and that farmlands with the fewest limitations be retained for agricultural purposes. These suggestions are squarely in line with USDA's revised land use policy statement, Secretary's Memorandum 1827.

Voluntary *and* regulatory controls would be needed, PLUARG said, but regulation should be used only where or when voluntary approaches do not achieve desired results. In the PLUARG agricultural survey, 56 percent of the Canadian farmers and 71 percent of the U.S. farmers said the best policy for reducing water pollution was to rely solely on the voluntary cooperation of farmers.

Importantly, PLUARG felt that governments should maximize the use of existing programs before creating new ones. The Section 208 agencies within the basin, the U.S. Environmental Protection Agency (EPA), through its Great Lakes National Program office, and the Great Lakes Basin Commission have strong roles to play in the United States.

Soil and water conservation districts—190 of them in the U.S. Great Lakes Basin—have been actively involved in Section 208 water quality management planning as well as in aiding individual land users. Canada has a less well defined mechanism for onsite assistance, but there is excellent potential within the conservation authorities; Agriculture Canada; the Ontario Ministry of Agriculture and Food and other agencies in the Province of Ontario; and universities.

Review and Evaluation

PLUARG said that in any review and evaluation of the pollution-control strategies chosen, nonpoint source interests should be represented, along with a strong public consultation effort. It also recommended that:

- Tributary monitoring be expanded for more accurate stream loading estimates of several pollutants;
- Sampling be based on stream response characteristics, with intensive sampling of runoff events where needed;
- The role of atmospheric inputs be evaluated;
- Data be coordinated better; and
- Adequacy of nearshore and offshore water surveillance be examined.

PLUARG did *not* recommend a rigid scheme for achieving target loadings. Rather, each jurisdiction should compare alternatives for cost-effective and politically acceptable solutions, and make better use of existing agencies and programs. By working primarily through existing agencies, and by giving special attention to the cropland within the most hydrologically active areas—perhaps less than 25 percent of the basin's agricultural land—PLUARG felt that total phosphorus loadings could be reduced by more than 1,000 metric tons a year.

Many recent developments in both nations have been encouraging: Planning, workshops, research and extension, technical help, cost sharing, and grants. If they continue, phosphorus loadings to the Great Lakes *will be reduced.*

In Ontario, for example, workshops have been held with leaders of farm organizations. PLUARG recommendations are receiving very positive consideration from conservation authorities. A program to subsidize erosion control and manure management practices was scheduled to begin this spring. All of Ontario is eligible—but most of the expenditures and benefits will be in the Great Lakes Basin.

In the United States, the Rural Clean Water Program authorized by the Clean Water Act of 1977 could become an important implementing authority. This cost-sharing program, influenced to a large degree by PLUARG's findings, will apply only in critical contributing areas shown in EPA-approved Section 208 plans. Agricultural Conservation Program (ACP) cost-sharing assistance to farmers for conservation practices also helps reduce erosion and improve water quality. Special ACP projects recently announced will focus on water-quality improvement. State cost-sharing programs for certain practices also have been authorized by legislation in Minnesota, Wisconsin, and Ohio.

In both nations, agencies and organi-

Above, better methods for managing livestock wastes are already in place in many Great Lakes watersheds, helping reduce phosphorus pollution from basin farmlands. Left, conservation tillage and other practices can reduce phosphorus losses as much as 50 percent, by softening the impact of raindrops, controlling direct runoff, and reducing soil erosion.

zations have shown a great ability to adapt to changing needs and priorities.

A Good Start

Application of water-quality management practices already has begun in several watersheds within the basin, as part of special projects or as part of ongoing assistance programs. Waste management systems built on farms in the U.S. part of the basin last year alone are equivalent to the capacity needed to handle wastes produced by a city of 360,000 people.

Soil surveys have been completed on almost 90 percent of the cropland within potential contributing areas in the U.S. Great Lakes Basin. These are an essential tool in locating specific hydrologically active areas and in selecting practices. Every SCS office also has a technical guide and several field manuals, and Canada has similar working tools.

A Look at the Future

The principal planning and implementing mechanisms are in place to make agriculture's contribution toward meeting water quality goals. We have recommended a management strategy that is adaptable to physical, social, and political conditions throughout the Great Lakes Basin. What is needed is a commitment—on the part of Federal, Provincial, State, and local governments—to direct the needed technical, financial, and educational resources toward meeting the phosphorus goals described in Annex 3 of the 1978 Great Lakes Water Quality Agreement and hoped for by the public.

Will strategies for phosphorus control be meshed with overall strategies for achieving water quality in the Great Lakes? We do not want to unnecessarily polarize pollution abatement into single-pollutant pigeonholes. We will be most effective by taking a holistic view that permits taking advantage of "piggyback" benefits of programs as well as avoiding contradictory results from separate programs.

These things *can* happen; I think they *will*; yet I think we must resolve to move a little faster.

While awaiting IJC's final recommendations, some very positive efforts are underway, with grassroots public support and local leadership. None has resulted in any new agencies being formed!

At an April meeting, agricultural experts from Ohio, Indiana, Michigan, New York, Pennsylvania, and Ontario had a tremendous sharing of experience and knowledge, and open and frank discussion of successes *and* failures. They gave repeated challenges to get the best possible information to farmers in the best possible way; and pointed out great differences in areas, in soil type and its response or behavior, and in climatic conditions and patterns.

I am convinced that we need to use all of our tools in the tool box, in whatever mix is called for in specific situations. No one strategy, no one practice will do it all. No-till is great where it fits, but we should not "throw away the plow."

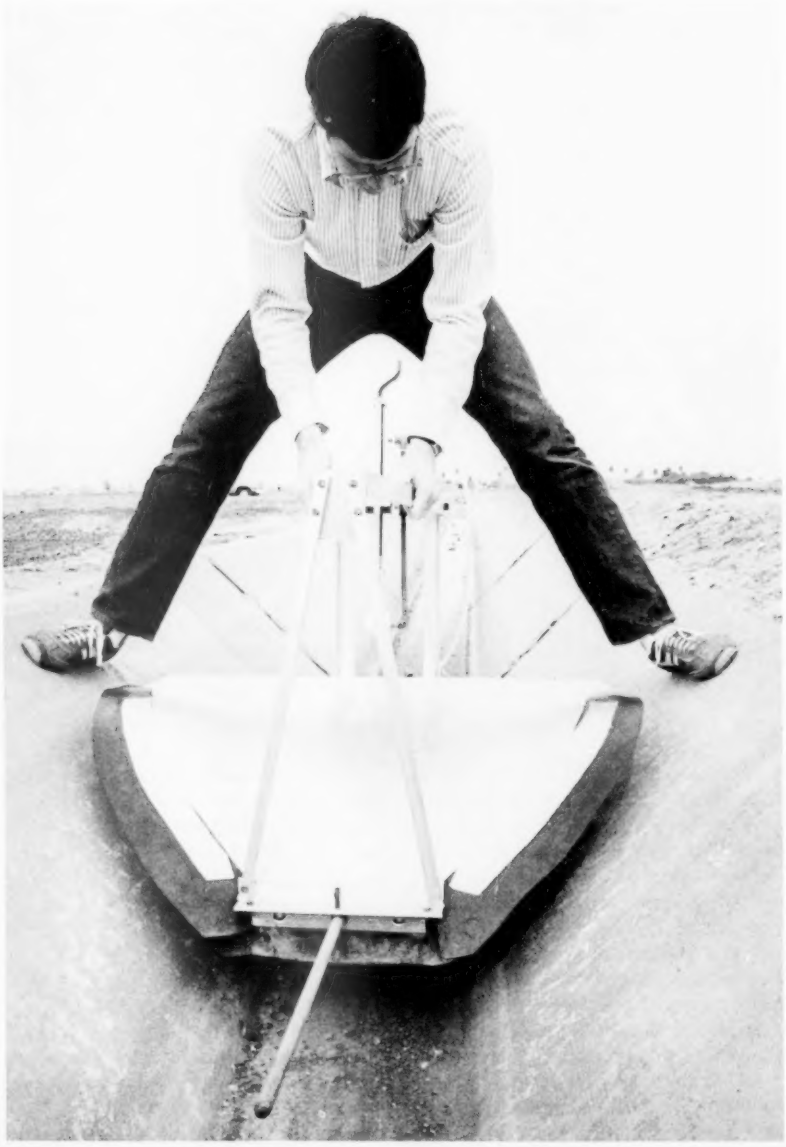
I am likewise convinced that water quality is more likely to improve if final land use and treatment decisions are made *in the field*. By far the best way to achieve an acceptable and effective program would be through one-on-one assistance to land users. With the small number of employees and volunteers available to do the job, however, we will have to augment the one-on-one with some other ways of sharing our knowledge with land users.

I am very optimistic about the future *if*, while we seek to expand our knowledge, we also will move quickly to help land users with what we already know.

In the United States, we have learned much through working with our Canadian friends in the PLUARG studies. These efforts will help our nations separately and jointly proceed with action programs to accomplish our goals for the Great Lakes.

Mr. Berg is associate administrator, SCS, Washington, D.C.

New Measuring Flume for Farm Irrigators



Albert J. Clemmens, SEA research hydraulic engineer, places the "turtle" flume into an irrigation canal. The portable flume is useful in obtaining field information on water flow rates prior to installing a permanent concrete flume. Pressure sensing holes in the extendable pipe transmit water depth to the small gaging well located over the flume sill. The "turtle" flume is easily portable and weighs about 25 pounds.

A simple new measuring flume has been developed by USDA's Science and Education Administration (SEA) to help irrigators measure amounts of water applied to their fields.

The new flume, designed for concrete-lined ditches, is accurate to plus or minus 2 percent of the rate of discharge. Although it costs less than $100 to install, it operates with less head loss than more complex flumes that cost as much as $1,000. It was designed by John A. Replogle, a hydraulic engineer at SEA's Water Conservation Laboratory, Phoenix, Ariz.

To produce good crops, conserve water, and improve downstream water quality, farm irrigators cannot afford to "guesstimate" the amount of water flowing to their crops. They need accurate measuring flumes to manage their water efficiently.

In the past, however, calibrating flumes for accurate measurement was a time- and labor-consuming process that contributed to the high cost. The rate at which water runs through a ditch depends on many variables in the ditch such as slope, width, depth, roughness, and the amount of sediment.

Conventional flumes cannot be calibrated mathematically. Most are built in a laboratory and calibrated by running a predetermined amount of water through them, then duplicated for installation.

Replogle devised a computer program that takes all variables into consideration and figures the rate of discharge, eliminating the complicated laboratory calibration process. The program made the simplified flume possible. In fact, the computer can calibrate long-throated flumes of any shape, as long as they have one flat, smooth surface.

The new style flume consists of a broad-crested weir, a dam with a flat, smooth top or sill. The sill is from 1 to 4 feet long, and its height and width also can be varied to fit different ditch sizes and flow rates. The dam causes a rise in the water upstream to create critical flow over the sill and allow accurate measurement.

A short ramp guides the water over the sill evenly. It also guides sediment and debris over the sill to keep the canal free of clogs. Small pipes, imbedded through the bottom of the ramp and dam, drain the ditch when not in use to eliminate stagnant water and to help control mosquitoes.

A gage is placed on the side of the ditch about a foot upstream from the end of the ramp to measure the critical flow. It is marked to read out in direct discharge units, such as gallons per minute or cubic feet per second, so the irrigators do not need calibration tables to figure the amount of water passing through to their fields.

Irrigators can easily install the simplified flumes with specifications and technical assistance from the Soil Conservation Service. SCS's National Engineering Bulletin No. 40–9–8 contains drawings, design tables, and design calculations for a typical broad-crested weir.

The only materials needed to build a flume are plywood and wire for forms, a few lengths of plastic pipe, concrete, and a gage. Flumes can be built with poured-in-place concrete or with hollow precast concrete.

A portable sheet metal flume also has been developed. Called the "turtle" because of its shape, the portable flume is especially useful to SCS engineers and soil conservationists, according to Ralph Arrington, SCS conservation engineer for Arizona.

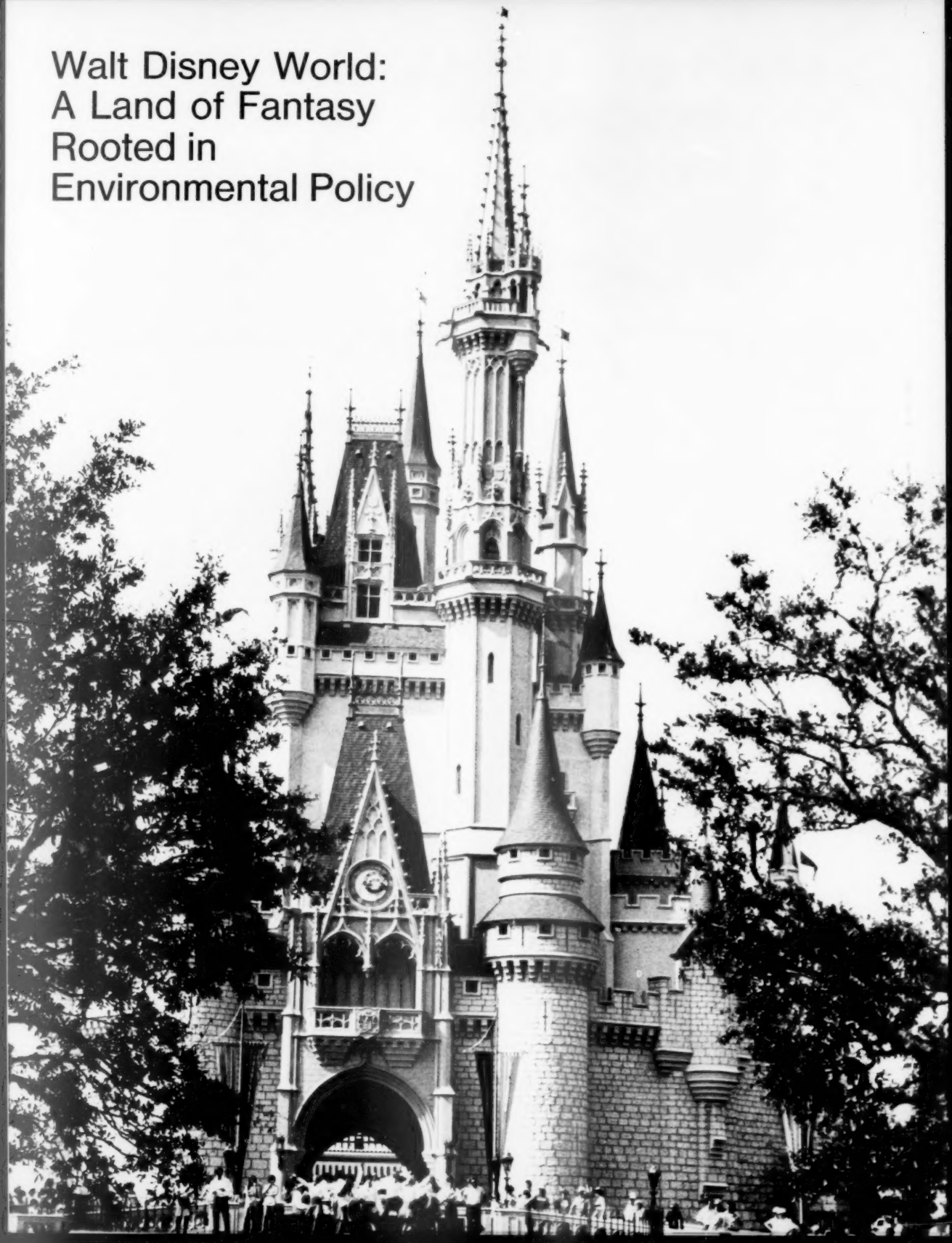
"We can use the turtle temporarily in irrigation ditches that have no permanent flume to meter the flow and help an irrigator determine his management efficiency. The turtle also helps us 'sell' the irrigator the idea of installing a permanent flume because it is accurate and easy to read and he can see how useful the flow rate information is for his particular farm," Arrington said.

The turtle also helps irrigators determine the proper size and placement for permanent flumes.

For the computer program that led to simplified flumes, the American Society of Civil Engineers awarded Replogle the Croes Medal, one of its highest honors.

Adapted from an article in the March 1979 issue of *Agricultural Research*.

Walt Disney World: A Land of Fantasy Rooted in Environmental Policy



Florida development proves that a good environment is good business.

by Anne Schuhart

Walt Disney was an environmentalist long before the word became popular. That ideology was epitomized through his wildlife documentaries and animated features.

But can a large corporation maintain idealistic environmental standards and still show a profit? Walt Disney World near Orlando, Fla., does.

"At Disney World, development of an esthetic environment is a way of life, and Disney has proved that it's money in the bank because it's a major factor in bringing people back. The esthetic quality of the park contributes to bringing guests back for their second, third, and fourth times," explained Tom Moses, head of the Reedy Creek Improvement District, a special tax district encompassing Walt Disney World.

Walt Disney World covers 27,500 acres, two-thirds of which lie in Orange County and the remainder in Osceola County. It attracts more than 14 million visitors annually. The services necessary to accommodate such a development would be a drain on the budgets of both counties; consequently, the Florida legislature created the Reedy Creek Improvement District to provide those services necessary for the construction and operation of Walt Disney World.

"The district has essentially the governmental controls exercised by counties, except for police power," said Moses. "We provide such services as fire protection, wastewater treatment, building codes, and environmental protection. The company, Walt Disney Productions, Inc., pays what amounts to an additional layer of taxes: regular taxes to the two counties, plus those essential taxes for the operation of the district.

"Preserving an esthetic environment was a major thrust of the development from the beginning—from the first rough sketches in California," Moses recalled.

"The company strategically located facilities so that a minimum number of trees and shrubs had to be disturbed. The district has over $8 million invested in the original stormwater control system alone, and that will be expanded as development continues. Even in the center of the main parking lot, the company preserved an 11-acre cypress dome because of its beauty.

"It's significant that when we began in 1968, the district set out the environmental parameters. At that time there were few environmental laws, and no permits were required from State agencies. In the initial phase, for example, Walt set aside 7,500 acres for a conservation area long before he had defined the locations and extent of the development."

To discourage concentrations of development close to the Disney Magic Kingdom, the theme park is located in the remote northwestern corner of the district. Access by the public is provided by a road from Interstate 4 and Florida Highway 192 northward through the middle of the property.

Disney has developed three golf courses, hotels, resort accommodations, a shopping area, office buildings and service areas, a 600-acre camp-

At Walt Disney World, environmental protection and esthetics are part of every phase of development. Even the banks of sewage lagoons are smoothly curved and well vegetated.

ground, and three lakes and lagoons north of Interstate 4. A 1,500-acre block of pasture and range, which is leased for cattle grazing, and a major portion of the 7,500-acre conservation area are south of the highway.

One of the first steps in developing Walt Disney World was the construction of 40 miles of canals and levees around the perimeter of the property with other canals interconnecting where development dictated. The canals are equipped with self-regulating water control structures, which enable the district to maintain normal levels during periods of drought and to safely discharge floodwaters after excessive storms.

The water table must be kept at a delicate balance—low enough so that the land can be used but high enough to maintain vegetation. "We use infrared aerial photographs, taken annually of the entire property, to check for stress in the vegetation," Moses said.

In keeping with the emphasis on esthetics, the entire canal system is well vegetated and immaculately maintained. It also is designed so that all canals are curvilinear and thus more

Above, a main canal was constructed around the Disney property, including the 7,500-acre conservation area. This native swamp provides shelter for wildlife, including alligators, wood storks, ospreys, sandhill cranes, and woodpeckers. At left, the canals are equipped with self-regulating water control structures enabling the district to maintain a constant water level.

appealing to the eye than the straight drainage ditches used in most places. It is not uncommon for guests to see deer and other wildlife on the grassy banks and levees.

Nonpoint source water pollution is a key target of the Reedy Creek Improvement District.

"Our guests, and the company, want to see clean water and a clean environment. That's part of our reputation and part of the show," said Fred Harden, manager of the company's Environmental Relations Department. The district employs a total of 13 biologists, chemists, botanists, and lab assistants to maintain that reputation.

The main parking lot, which can accommodate 12,000 cars, is also divided by drainage canals. Grass swales along the canals filter runoff and provide greenery. In addition, all trash is vacuumed from the parking lot every night to make sure that none washes into the canals.

Near areas under construction, "turbidity curtains" are placed in waterways to prevent spread of sediment. The sediment is chemically treated so that it settles quickly to the bottom.

"The Reedy Creek Improvement District Pollution Control Department runs 30,000 analyses a year to monitor the quality of the water as it enters and leaves the property. We make sure that it contains no effluent from the waste treatment plant or pollution from the theme park. We now have background data on the water quality here for at least 5 years," said Pat Harden, a biologist with the district pollution control department.

"In fact, Disney is one of the few developers that started out with raw land and clean air and kept records on how the construction and operation affected the environment from the day the first bulldozer moved in," added Moses.

"Our lab is one of the best equipped in the State for testing water quality," Pat Harden said. It includes an atomic absorption unit with an electro-thermal atomizer which measures parts per billion of heavy metals (parts per trillion in some cases). It also has a gas chromatograph to analyze pesticides.

"There are citrus growers around the property, and they use chemicals. We also use certain approved pesticides," she explained.

"If the water in Reedy Creek becomes polluted," she continued, "Disney will get the blame whether they contributed to the problem or not simply because they are such a big and visible operation."

"That is one reason why we have tighter codes and regulations than other government entities," said Moses. "We also cooperate with Orange and Osceola Counties in an effort to control cleanliness of the water in our watershed.

"We're not opposed to periphery development in the counties so long as it doesn't degrade the environment, especially the quality of the water that drains into our property."

Because of the number of tourists, the area is growing rapidly. However, some of the nearby land is not suitable for development.

"For example, there are 1,500 acres of undeveloped land directly north of the theme park, and the drainage would have to come through Walt Disney World," said Richard Hoffman, Soil

A "turbidity curtain" across a canal along the main parking lot catches sediment downstream from a construction site.

Conservation Service district conservationist at Orlando.

"The owner divided the land into 5- to 140-acre blocks and advertised it for sale as 'prime development land next to Disney.' Only about 20 percent of the land has potential for development, and the whole tract is a long way from the entrance gate to Disney World," he said.

"Orange County asked SCS to do a soils report. The report shows that almost all the land is swamp and floods every summer, and much of the area is covered with 5 to 10 feet of muck. The county stopped the auction until the advertising reflected the true conditions."

SCS has provided technical assistance to Disney World since the Reedy Creek Improvement District became a cooperator with the Orange County Soil and Water Conservation District in 1973.

"Our relationship with SCS is a good one," said Fred Harden. "It began when Fred Merrill was district conservationist, and he started interpreting soil surveys and helping us develop our conservation plan. The soils information has proved correct and we have relied on it over the years."

The information is used in the planning of all future projects at Walt Disney World.

SCS used the soils data as a basis for evaluating sites for land treatment of 3 million gallons of secondary treated sewage effluent a day. According to the permeability and available water capacity of the soils, the depth of the root zone, and the water use rate of grass, SCS determined the amount of partly treated effluent that could be applied safely to the land at a time, the acreage needed for treatment each day, the number of days needed between applications on each plot for proper cycling, and the total acreage required.

"We've planted close to 1,000 acres of slash pines, and we've planted sand pines where the survey shows the soils

Standing in front of the soils map, District Conservationist Richard Hoffman (right) discusses use of the soils information with Fred and Pat Harden.

are suitable. We've had good results with both," said Pat Harden. "We've also planted test plots of eucalyptus according to the survey to check their growth rates on different soils."

Looking ahead, the Reedy Creek Improvement District contracted with the U.S. Geological Survey to construct control wells in the conservation area. The wells are monitored to provide background data on the ground water as a basis for future comparisons. The soil survey was used to place wells in representative soils.

SCS also has helped solve a number of other problems, including controlling shoreline erosion around the lakes and stabilizing critically eroding areas.

"Environmental services constitute about 30 percent of the district's budget," said Moses. "We spend about $2 million a year on the water management system and pollution control. Just the maintenance on the water control system approaches $300,000 a year, and we spend approximately the same amount on the lab operations monitoring water quality.

"We go beyond the minimum," he continued, "because the district and the company believe it is the best investment we can make. Preserving the environment not only serves the best interest of the public, but it also helps attract people to Walt Disney World.

"That is not to say that economics are not a concern, but our priorities are significantly different from those of other developers and governmental entities." That's what makes the Reedy Creek Improvement District unique.

Ms. Schuhart is a writer-editor, Information Division, SCS, Washington, D.C.

Shoreline erosion is controlled with grass in most places and riprap in a few critical spots.

The Soil and Water Resources Conservation Act (RCA)

Where We've Been

RCA requires USDA conservation programs to be responsive to the long-term needs of the Nation. The act calls for an appraisal of the Nation's non-Federal land and water resources. It also mandates public participation in the appraisal and in developing a national program for conserving these resources. As part of the Public Participation Program, nearly 9,000 locally organized RCA meetings were held in 1978. Results of the meetings indicate that America's citizens are definitely concerned about the future of the Nation's natural resources.

More than 164,000 people participated in the public meetings which outlined the RCA process, obtained the public's views regarding soil and water conservation, and identified possible solutions to resource problems.

The meetings were conducted with the assistance of local soil and water conservation districts and were generally held in individual counties. Multiple meetings were held in many densely populated counties.

Worksheets outlining the major resource topics discussed at each meeting were completed by the local Soil Conservation Service district conservationist based on conclusions reached at each local meeting.

The following numerical ranking shows the number of meetings where the particular issue was brought forth and discussed as a major natural resource concern. The figures do not represent a ranking "of importance" by the reporting offices. Air quality and wetlands, for example, each appeared on about 300 worksheets. This indicates that these issues are considered major local environmental issues by one out of every 10 counties.

A composite of the 3,485 worksheets indicates the following distribution of major natural resource or environmental concerns:

Resource Concern	Number of Responses
Soil erosion	2,994
Food and fiber production	2,443
Land use	2,163
Water supply	2,042
Water quality	1,606
Socio-political	1,438
Flooding	1,262
Irrigation	1,244
Rural development	1,234
Prime, unique, and important farmland	1,202
Drainage	1,042
Recreation	1,031
Forestry	1,027
Wildlife habitat	933
Land disposal of organic waste	931
Fish habitat	568
Other	537
Mining	452
Environmental	430
Wetlands	303
Air quality	300

As expected, the public's major resource concerns were those encountered in their local area or State. For instance, irrigation ranked as a major concern in western States, Georgia, and Florida, but received a low priority in other parts of the Nation. This would reflect the role irrigation plays in local agricultural activities. In contrast, land use was indicated as a major concern all across the Nation, resulting in its appearing on a greater number of meeting reports than irrigation.

The expressed concerns are being compared with the National Resource Inventories factual data which will be included in the Appraisal Report.

Public participation in the RCA process is designed to obtain the thoughts of local citizens about local natural resource and environmental problems. The results of the first series of meetings have provided clear indications of the Nation's major environmental concerns as expressed by more than 164,000 citizens.

Where We're Headed

Detailed planning is now progressing on the 1979 Public Participation Program. After publication and distribution of the draft appraisal, program, and policy documents in early fall, a 60-day public review will be held. During this time, comments about document contents will be accepted by USDA. Full details of where the documents will be located for review, exact review period dates, public meeting dates and locations, and how the public comments are to be used will be published in the Federal Register at the start of the public review period.

Soil Conservation Magazine

Soil Conservation Service
U.S. Department of Agriculture

Volume 44

August 1978 through
July 1979

INDEX

A–E

Administrator's Messages
A Fresh Opportunity; A Fresh Challenge, June.
A Guide to Saving the Great Lakes, Nov.
Innovations in SCS Planning Assistance, Dec.
Meeting Clean Water Goals, Aug.
Meeting the Challenges of the Rural Clean Water Program, Oct.
SCS Employees: "A Cut Above," May.
Technology for Conservation: Why Not the Best? Mar.
The Public Voices Its Concern, Sept.
To Change the Land-Use Collision Course with Disaster, Jan.
Waste Management—More Help for Farms and Cities, Apr.
Water for Tomorrow, July.
Working Together for Wildlife, Feb.

Community Resource Planning
A Guide to Grow By (Mass.). Susan Alward, Sept., p. 8.

Conservation Education and Youth
A Teaching Resource for Resource Teachers (Pa.). Karl Hellerick, Jan., p. 16.
All in a Day's Work (Md.). Ted Kupelian, Dec., p. 10.
And the Winners Are. . . . Thomas Levermann and Kay Mergen, Feb., p. 20.
City Course in Soils Study (Mo.). Robert Brejcha, Jan., p. 4.
Conservation Planning with Class (Ill.). William McCartney and Jane Johnson, Jan., p. 14.
4–H Club Boosts Conservation (Kans.). Fred Trump, Sept., p. 18.
Long-Range View of Learning (D.C.). Sylvia Shugrue, Jan., p. 12.
My Conservation Book. June, p. 20.
Nature Study on Top of Green Mountain (Ala.). George Fears and Sammy Harris, Nov., p. 4.
SCS on Display (Iowa). Mar., p. 15.
They Came Out Smelling Like a Rose (La.). Gene Warren, Jan., p. 22.
Winning Places (Ohio and Wash.). Thomas Levermann and Kay Mergen, Jan., p. 5.
Youth Learn to Be at Home on the Range (Mont.). Eugene Handl and Brad Anseth, Sept., p. 22.

Conservation Tillage
Cheatgrass Gets Caught with Conservation (Kans.). Fred Trump, Aug., p. 18.

Cropland
Cheatgrass Gets Caught with Conservation (Kans.). Fred Trump, Aug., p. 18.
Crops Sprout on Spoil (Va.). Ronald Morse, John Swiader, and P. J. Porpiglia, Dec., p. 14.
Farming Above the Arctic Circle (Alaska). Roger Rayburn, Sept., p. 4.
Managing Crop Residues (S.C.). Bethel DuRant, Oct., p. 21.

Economics
Conservation Up . . . Profits Up (Vt.). Ann Dudas, Oct., p. 15.
Something to Brag About (Ill.). William McCartney, May, p. 16.

Emergency Assistance
After the Rain (Calif.). Judith Ladd, Feb., p. 7.
The 3-Week Inferno (Calif.). Crystal Williams, Feb., p. 6.

F–N

Energy Conservation
Burying Your Home to Save Energy? Better Check the Soil First. Oct., p. 22.
Control Evaporation and Save Water, Energy, and Money. Mar., p. 21.
Farm Pond Saves Energy (Ohio). Charles McCluskey, Jr., and Charles Rinehart, Mar., p. 6.
Wood Chips for Fuel (N.Y.). Patricia Paul, Sept., p. 16.

Environment
Calls from the Wild (N.J.). Gordon Smith, Dec., p. 4.
Conservation Highlights 1978. Mar., p. 17.
Good Land Care: Cleaner Great Lakes. Norman Berg, July, p. 4.
Save Our Streams—Adopt One. Shirley Fields, Feb., p. 15.
The Soil and Water Resources Conservation Act (RCA). July, p. 18.
They Came Out Smelling Like a Rose (La.). Gene Warren, Jan., p. 22.
USDA, EPA Agree on Rural Program Cooperation. June, p. 16.
USDA Teamwork in Reclamation. David Unger, May, p. 11.
Walt Disney World: A Land of Fantasy Rooted in Sound Environmental Policy (Fla.). Anne Schuhart, July, p. 12.

Erosion Control
Erosion—It's Not Just a Farm Problem (Nebr.). Emmett Egr, Aug., p. 16.
Flax Strips on Fallow Land (S. Dak.). Del Schapekahm, Apr., p. 22.
Grass in the Orchards—It's Not All Bad (S.C.). Pierce Drummond, Aug., p. 17.
Helping Mountain Homes Hold Their Yards (N.C.). Robert Carter, Jr., Sept., p. 20.
Keeping the Airport in Place (Ariz.). Albert Neu, Mar., p. 7.
Looking for Trouble (Mich.). Roger Howell, Dec., p. 18.
Managing Crop Residues (S.C.). Bethel DuRant, Oct., p. 21.
Model Ordinance for Erosion and Sediment Control (Mo.). Robert Brejcha, Apr., p. 19.
New Laboratory for Soil Erosion Research. Mar., p. 21.
Nudging Nature (Va.). Stuart Finley, Nov., p. 11.
Pulling the Reins on Mountain Gullies (Colo.). Joseph Alessi, Oct., p. 18.
Putting Up a Good Fight (S.C.). Donald Click, Dec., p. 20.
Second Generation Conservationist (Tenn.). Nancy Garlitz, Nov., p. 16.
Skiing in Winter, Gullies in Summer (Wis.). Glenn Garvey, Mar., p. 4.
Successful Dairy Farm in Puerto Rico. Jorge Rivera-Quiñones, Apr., p. 16.
'Sunglow' for Erosion Control. Barbara Maus, June, p. 6.
The Canyons Are Alive (Ga.). Frank Blackburn, Feb., p. 4.
Three Wheeling Through Texas. Eual Davis, Jan., p. 17.
Trefoils: Backbone of Erosion Control (Oreg. and Wash.). Jack Carlson and Stan Swanson, Mar., p. 10.
USDA-TVA Pack Targets Tennessee Erosion Problems. June, p. 16.
Yesterday's Trees, Today's Jobs (Mich.). Roger Howell, Nov., p. 6.

Flood Control and Flood Plain Management
After the Rain (Calif.). Judith Ladd, Feb., p. 7.
Help for a Soggy Tree Farm (Pa.). Frederick Bubb, Apr., p. 18.
President Carter Calls for 25 New Small Watershed Projects. Sept., p. 23.
The 3-Week Inferno (Calif.). Crystal Williams, Feb., p. 6.
The Water That Came to School (Oreg.). Dave Anderson, May, p. 20.

Great Plains
An Unequaled Record (Mont.). Dean White and Ron Nadwornick, Mar., p. 9.
Help to Make It Through the Drought (Okla.). F. Dwain Phillips, Aug., p. 20.

Irrigation
Let a Computer Tell You When to Irrigate. Mar., p. 22.
New Measuring Flume for Farm Irrigators. July, p. 12.

Management
Counting on You. William Hance, Mar., p. 12.
Memorandum Expands SCS Assistance to FmHA Borrowers. July, p. 23.

New Publications and Reviews
Cooperative River Basin Studies: Helping Planners. June, p. 20.
Helping Wildlife: Working with Nature. Nov., p. 21.
List of Published Soil Surveys. June, p. 21.
Montana Grazing Guides. June, p. 20.
My Conservation Book. June, p. 20.
Plant Performance on Surface Coal Mine Spoil in Eastern United States. Nov., p. 21.
Potential Cropland Study. Nov., p. 22.
Preserving America's Farmland. June, p. 20.
Protecting Wetlands and Wildlife. June, p. 21.
The Idea That Worked: America's Conservation Districts. Nov., p. 21.

P–S

The Reclamation of Disturbed Arid Lands. Feb., p. 23.
Trees, Soils, and People. June, p. 21.
Your Role in Conservation's Future. Nov., p. 21.

Pasture Management
Grazing Through All Kinds of Weather (Va.). T. B. Trew and Helen Jeter, Aug., p. 21.

People
A Touch of Georgia in Rhode Island. Gordon Leckie, May, p. 22.
Cowboy Preacher (La.). Gene Warren, Mar., p. 16.

Plant Materials
A Cold, Dry Reclamation Challenge (Wyo.). Louis Engstrom and Everet Bainter, June, p. 10.
An Uncommon Hold on Water. Bruce Hennie, June, p. 22.
'Bobwhite' Is for the Birds. Jimmy Henry and Richard Brown, June, p. 8.
'Garrison' Creeps into South Dakota. F. Dee Watson, Aug., p. 22.
Landscaping With a Beautiful Redhead. Jimmy Henry, June, p. 17.
New Conservation Plants Released. June, p. 17.
New Insights on Warm-Season Range Grasses. G. Jung, C. Gross, W. Sharp, R. Kocher, and L. Burdette, May, p. 8.
Nudging Nature (Va.). Stuart Finley, Nov., p. 11.
'Sunglow' for Erosion Control. Barbara Maus, June, p. 6.
Tasty Lespedezas. Cluster Belcher and W. Curtis Sharp, June, p. 4.
The Plant That Came Out of the Cold. George Brodie, June, p. 7.
Trefoils: Backbone of Erosion Control (Oreg. and Wash.). Jack Carlson and Stan Swanson, Mar., p. 10.

Pond(s)
Cypress Pond Attracts Wood Storks (Fla.). Anne Schuhart, Sept., p. 12.
Farm Pond Saves Energy (Ohio). Charles McCluskey, Jr., and Charles Rinehart, Mar., p. 6.

Range Management
A Total Approach to Range Management (Tex.). Freddie Williams and Kenneth Sparks, May, p. 4.
Contour Furrows Make Deserts Bloom. Mar., p. 21.
Montana Grazing Guides. June, p. 20.
New Insights on Warm-Season Range Grasses. G. Jung, C. Gross, W. Sharp, R. Kocher, and L. Burdette, May, p. 8.
Telling Cattle Where to Graze (N. Mex.). Howard Harkey and Noel Marsh, Jan., p. 20.
Water Springs Up on the Range (Wyo.). Kerry Powers, Mar., p. 8.
Youth Learn to Be at Home on the Range (Mont.). Eugene Handl and Brad Anseth, Sept., p. 22.

Recreation
A Touch of Georgia in Rhode Island. Gordon Leckie, May, p. 22.
Meeting a Special Need (Okla.). F. Dwain Phillips, May, p. 21.

Research
A Soil and Water Lab for Appalachia. June, p. 18.
Contour Furrows Make Deserts Bloom (Mont.). Mar., p. 21.
Control Evaporation and Save Water, Energy, and Money (Ariz.). Mar., p. 21.
Current Directions in Conservation Research. May, p. 17.
Let a Computer Tell You When to Irrigate. Mar., p. 22.
Natural Aid to Tree Growth. Dec., p. 22.
Frost-Measuring Network Predicts Winter Flooding. Dec., p. 22.
New Laboratory for Soil Erosion Research (Ind.). Mar., p. 21.
Predicting Wind Erosion Protection of Range Grasses. June, p. 18.
Research Aimed at Restoring Mined Areas. Dec., p. 23.
Topsoil Needed for Mine Spoils (N. Dak.). Mar., p. 22.
Water and Nitrogen Management Take Extra Effort on Sandy Soil. June, p. 19.

Soil Survey(s)
Burying Your Home to Save Energy? Better Check the Soil First. Oct., p. 22.
High and Dry, Thanks to Soil Survey (Nebr.). Charles Hammond, Oct., p. 14.
List of Published Soil Surveys. June, p. 21.
Rio Grande Delta: A Soils Sampler (Tex.). Harold Hyde, Oct., p. 8.
Soil Survey Wins Popularity Contest (Mich.). Roger Howell, Oct., p. 11.
The Canyons Are Alive (Ga.). Frank Blackburn, Feb., p. 4.
Unearthing the Soils' Secrets. John Cross, Oct., p. 4.

Surface Mining
A Better Farm After Coal Mining (Pa.). Frederick Bubb and Lee Shields, Dec., p. 8.
A Cold, Dry Reclamation Challenge (Wyo.). Louis Engstrom and Everet Bainter, June, p. 10.

W

Crops Sprout on Spoil (Va.). Ronald Morse, John Swiader, and P. J. Porpiglia, Dec., p. 14.
RAMP: A Lift for Pennsylvania. Graham Munkittrick, June, p. 11.
Research Aimed at Restoring Mined Areas. Dec., p. 23.
The Reclamation of Disturbed Arid Lands. Feb., p. 23.
Topsoil Needed for Mine Spoils. Mar., p. 22.
USDA Teamwork in Reclamation. David Unger, May, p. 11.

Waste Management
Composting Sewage Sludge. Apr., p. 8.
Conservation Plus Automation Equals Success (N.C.). Frank Jeter, Jr., Apr., p. 14.
Conservation Practices Help Meet Clean Water Goals. James Johnson, Aug., p. 6.
Duck Farmers Control Pollution (N.Y.). Anthony Esser, Apr., p. 6.
Land Application of Sludge (N.Y.). Jamon Baker, Apr., p. 4.
The Eyes Have It (Wis.). Steve Foland, Dec., p. 16.
Waste but Not Wasted. Apr., p. 10.

Water Quality
All in a Day's Work (Md.). Ted Kupelian, Dec., p. 10.
Conservation Practices Help Meet Clean Water Goals. James Johnson, Aug., p. 6.
Good Land Care: Cleaner Great Lakes. Norman Berg, July, p. 4.
PLUARG Report: A Guide to Improved Water Quality in the Great Lakes. Nov., p. 23.
Save Our Streams—Adopt One. Shirley Fields, Feb., p. 15.
Something to Brag About (Ill.). William McCartney, May, p. 16.
Upgrading Water Quality. David Unger, Aug., p. 4.
What Is 208? Frank Jeter, Aug., p. 15.

Water Supply
Helicopter Helps Dam Builders in Wilderness Area (Mont.). Sept., p. 21.
Help to Make It Through the Drought (Okla.). F. Dwain Phillips, Aug., p. 20.
SCS Reaches Isolated Communities (Puerto Rico). Maximino Díaz, Sept., p. 6.
Water for All Seasons (Kans.). James Scott, June, p. 15.
Water Springs Up on the Range (Wyo.). Kerry Powers, Mar., p. 8.

Wetland(s)
Dairyland Interest in the Water Bank (Wis.). Steve Foland, Jan., p. 18.
Protecting Wetlands and Wildlife. June, p. 21.
Where the Wetlands Are. Anne Schuhart, Nov., p. 17.

Wildlife
'Bobwhite' Is for the Birds. Jimmy Henry and Richard Brown, June, p. 8.
Cypress Pond Attracts Wood Storks (Fla.). Anne Schuhart, Sept., p. 12.
Dairyland Interest in the Water Bank (Wis.). Steve Foland, Jan., p. 18.
Protecting Wetlands and Wildlife. June, p. 21.
Tasty Lespedezas. Cluster Belcher and W. Curtis Sharp, June, p. 4.

Windbreaks
Family Style Conservation (Mont.). Ernest Busek, Oct., p. 20.

Woodland Management
Christmas Trees Trim Erosion (N.C.). Frank Jeter, Dec., p. 21.
Help for a Soggy Tree Farm (Pa.). Frederick Bubb, Apr., p. 18.
Knowing and Growing Trees (La.). Gene Warren, Nov., p. 15.
Sugar Maples Milked as if They Were Cows (Va.). Helen Jeter, Nov., p. 8.
Tree Bank for Stevens County (Wash.). Branislav Lalich, Mar., p. 14.
Working on the Woods (W. Va.). Jack Busfield and Jerry Fox, Nov., p. 10.
Yesterday's Trees, Today's Jobs (Mich.). Roger Howell, Nov., p. 6.

News Brief

Memorandum Expands SCS Assistance to FmHA Borrowers

A memorandum of understanding signed in May by the administrators of USDA's Farmers Home Administration (FmHA) and Soil Conservation Service (SCS) will make available to FmHA and its borrowers additional information from SCS on soil, water, land use, and environmental questions and problems.

Signed by R. M. Davis of SCS and FmHA's Gordon Cavanaugh, the understanding will make it easier for SCS to provide practical technical information to FmHA borrowers under the agency's four credit categories: farm, rural housing, community programs, and business and industry.

The memorandum spells out a working understanding between the two agencies aimed at making SCS technical expertise available, when needed, for:

- Conservation planning on FmHA borrowers' farms;
- Planning community-type water supply and waste (including solid waste) disposal facilities financed by FmHA;
- Environmental assessments and impact statements related to projects financed by FmHA;
- Identifying erosion hazards and soil limitations, if any, for areas under consideration as FmHA financed building sites.

FmHA, the farm and rural development credit arm of USDA, provides financial and technical assistance to rural and smalltown families and communities handicapped by inadequate resources.

Both FmHA and SCS have local programs in nearly every county of the United States.

The memorandum signed by the two agriculture department agencies replaces an outmoded understanding between them. The memo also supports the department's land use policy as spelled out by Secretary of Agriculture Bob Bergland.

Meetings:

July	
10	No-Tillage Systems Conference, Lexington, Ky.
14–28	National Association of Counties, Kansas City, Mo.
19–21	Izaak Walton League of America, Inc., Anaheim, Calif.
22–26	National Federation of Business and Professional Women's Clubs, Inc., Boston, Mass.
28–Aug. 1	American Association of Nurserymen and Southern Nurserymen's Association Convention and Horticultural Trade Show, Atlanta, Ga.
29–Aug. 1	American Agricultural Economics Association, Pullman, Wash.
29–Aug. 1	Land Application of Waste Materials Conference, Ottawa, Ontario, Canada
29–Aug. 1	Soil Conservation Society of America, Ottawa, Ontario, Canada
August	
5–8	National Farm & Power Equipment Dealers Association, Detroit, Mich.
5–10	Joint Meeting of the American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America, Fort Collins, Colo.
12–16	Conservation Education Association, Dingmans Ferry, Pa.
19–22	American Institute of Chemical Engineers, Boston, Mass.
September	
5–7	American Water Works Association, Chesapeake Section, Ocean City, Md.
9–12	International Association of Fish and Wildlife Agencies, West Yellowstone, Mont.
12–14	American Fisheries Society, West Yellowstone, Mont.
22–26	American Society of Landscape Architects, New Orleans, La.
24–28	Federal Bar Association, San Antonio, Tex.
25–28	National Conference of Editorial Writers, Phoenix, Ariz.
26–30	The American Horticultural Society, Palm Beach, Fla.
30–Oct. 3	Farm and Industrial Equipment Institute, San Francisco, Calif.
30–Oct. 4	National Association County Agricultural Agents, Rapid City, S. Dak.

☆U.S. Government Printing Office: 1979—280-929/4

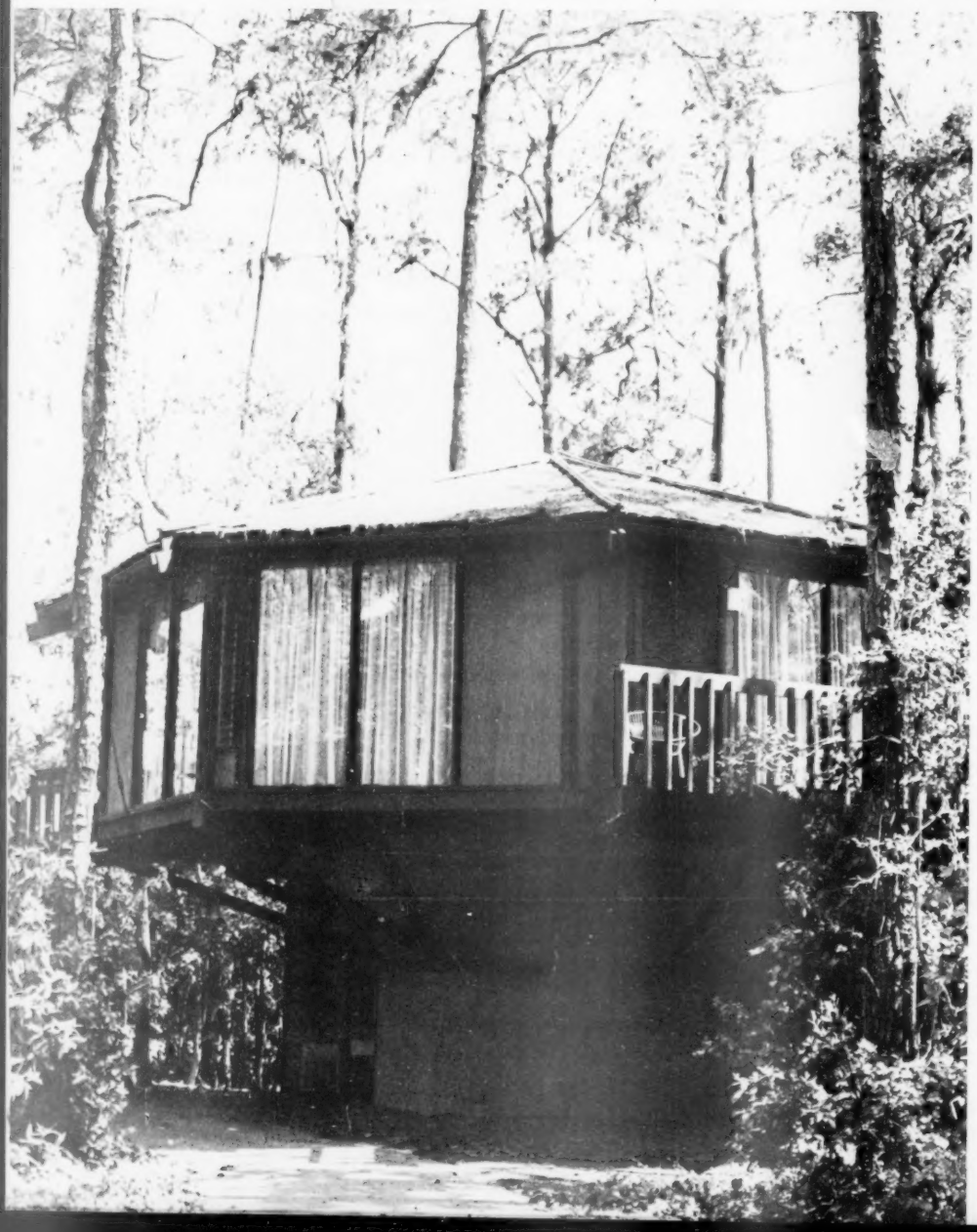
Moving?

Send present mailing label and
new address including zip code to:

U.S. Department of Agriculture
Soil Conservation Service
P.O. Box 2890, Room 0054-S
Washington, D.C. 20013

Official Business
Penalty for private use, $300

Controlled Circulation
Postage Paid in
Washington, D.C.
AGR 101

U.S.MAIL

SC XER 0X300 XEI S5DUE001R 1
XEROX UNIV MICROFILMS
SERIALS DEPT
300 NORTH ZEEB RD
ANN ARBOR MI 48106